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Mirohelminthosporium gen. nov. for an atypical *Helminthosporium* species and *H. matsushimae* nom. nov.

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Abstract—*Mirohelminthosporium* is proposed as a new genus for *Helminthosporium bigenum*, characterized by polytretic and blastic conidial ontogeny on the apical conidiogenous cells. A replacement name, *Helminthosporium matsushimae*, is proposed for the illegitimate later homonym *H. cylindrosporum* Matsush.

Key words—asexual *Ascomycota*, *Helminthosporium dimorphosporum*, hyphomycetes, systematics

Introduction

Helminthosporium Link typified by *H. velutinum* Link is characterized by macronematous unbranched erect conidiophores (Link 1809). The conidiogenous cells are polytretic, integrated, terminal and intercalary, and determinate, with the conidiogenous loci at the apex and laterally below the septa. The conidia are solitary, obclavate to cylindrical-obclavate, distoseptate,

sometimes rostrate, smooth, subhyaline, olivaceous, brown, and usually with an evident dark brown or brown basal scar. The *Helminthosporium* generic concept treated by Alcorn (1983, 1988), Ellis (1961, 1971), Hughes (1958, 1980a,b), Shirouzu & Harada (2004), Voglmayr & Jaklitsch (2017), and Zhang & Zhang (2009) clarified the morphological and molecular phylogenetic delimitation of the genus. Additionally, several *Helminthosporium* species with blastocatenate distoseptate and dictyoseptate conidia were transferred into *Ellismarsporium* R.F. Castañeda & X.G. Zhang and *Stanhughesiella* R.F. Castañeda & D.W. Li (Castañeda-Ruiz & al. 2017).

Helminthosporium bigenum has an unusual combination of holoblastic euseptate conidia from apical conidiogenous cells and tretic (enteroblastic) distoseptate conidia from intercalary conidiogenous cells (Matsushima 1993). Conidial ontogeny and conidiogenous events have been considered the fundamental criteria for asexual fungal taxonomy and generic delimitation (Kendrick 2017, Seifert & al. 2011). Consequently, we propose the new genus *Mirohelminthosporium* to accommodate the atypical *Helminthosporium* species, *H. bigenum*. A replacement name, *Helminthosporium matsushimae*, is proposed for the illegitimate later homonym *H. cylindrosporum* Matsush.

Taxonomy

Mirohelminthosporium K. Zhang, D.W. Li & R.F. Castañeda, **gen. nov**.

MB 833028

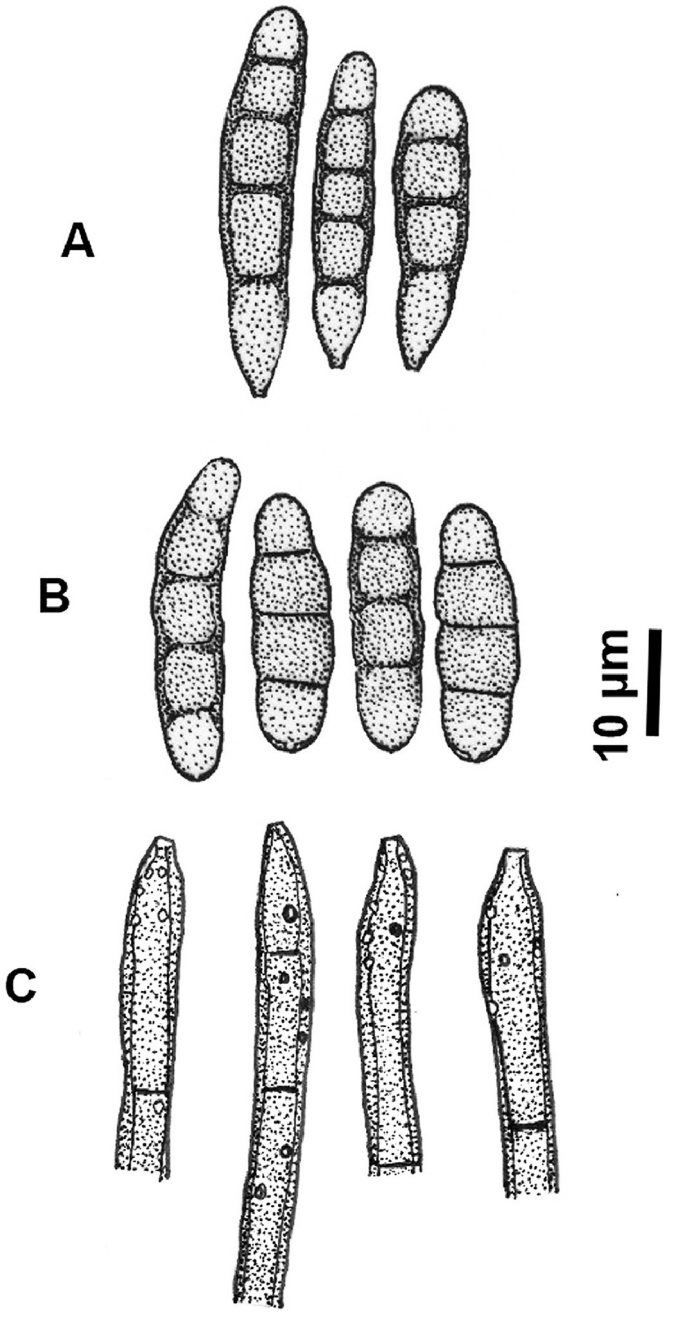
Differs from *Helminthosporium* by its holoblastic and primarily monoblastic conidial ontogeny, and its production of euseptate conidia on the apical conidiogenous cells beside or near the tretic loci.

Type species: *Helminthosporium bigenum* Matsush. [≡ *Mirohelminthosporium bigenum* (Matsush.) K. Zhang & al.]

Etymology: Latin, *Mirus-* meaning wonderful, extraordinary, remarkable + Latin, *-helminthosporium*, referring to the genus *Helminthosporium*.

Colonies on CMA medium hairy, brown to dark brown. Conidiophores macronematous, mononematous, unbranched, erect, straight, cylindrical, septate, smooth, brown to dark brown. Conidiogenous cells biontogenous, sometimes on the same cell: i) polytretic, integrated, mostly intercalary, cylindrical, sometimes terminal with subapical tretic loci and apical blastic loci; ii) monoblastic, integrated, terminal, sometimes with

Fig. 1. *Mirohelminthosporium bigenum* (Adapted from Matsushima 1993, figs 693–696; *H. bigenum* holotype, MFC OP-440). A. Conidia from blastic loci. B. Conidia from tretic loci. C. Conidiogenous cells.


A
B
10 µm
C

several tretic loci near below the blastic locus on the same cell. Conidia solitary, dimorphic: i) acropleurogenous, mostly pleurogenous, cylindrical, oblong, straight or curved, rounded at the ends, melanized or obscure at the base, distoseptate, smooth, brown to dark brown or black, dry, borne on tretic conidiogenous loci; ii) acrogenous, solitary, cylindrical, clavate to subclavate, attenuate, rounded or obtuse at the apex, truncate at the base, euseptate, smooth, brown to dark brown or black, dry, borne on the apical blastic conidiogenous loci.

Mirohelminthosporium bigenum (Matsush.) K. Zhang, D.W. Li & R.F. Castañeda, **comb. nov.** Fig. 1

MB 833029

≡ *Helminthosporium bigenum* Matsush., Matsush. Mycol. Mem.7: 53 (1993).

Helminthosporium matsushimae D.W. Li, K. Zhang & R.F. Castañeda, **nom. nov.** Fig. 2

MB 833030

≡ *Helminthosporium cylindrosporum* Matsush., Matsush. Mycol. Mem.7: 54 (1993), nom. illeg. (non Sacc. 1876).

Notes: Index Fungorum (2019) lists 770 taxonomic names in *Helminthosporium*, but many of these have been transferred to the genera *Bipolaris* Shoemaker, *Curvularia* Boedijn, *Drechslera* S. Ito, *Exserohilum* K.J. Leonard & Suggs, *Exosporium* Link, *Ellismarsporium*, and several other genera.

Anisospadicoides R.F. Castañeda & al. is another genus with blastic and tretic conidial ontogeny but in that instance, both types of conidiogenesis produce euseptate conidia (Qiao & al. 2019).

Helminthosporium dimorphosporum Hol.-Jech. (Fig. 3), which produces distoseptate and euseptate conidia through the same tretic loci (Holubová-Jechová 1987), does not fit the *Helminthosporium* generic concept and needs to be revised.

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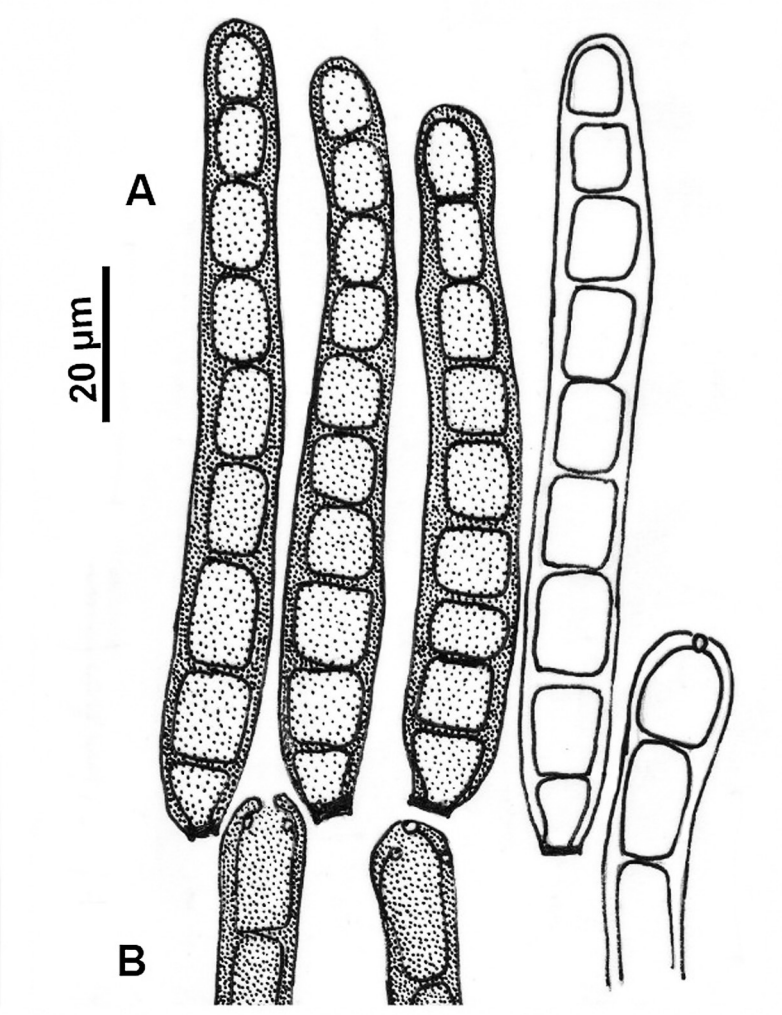

Fig. 2. *Helminthosporium matsushimae*
(Adapted from Matsushima 1993, figs 239, 686; *H. cylindrosporum* holotype, MFC OP-658).
A. Conidia. B. Conidiogenous cells.

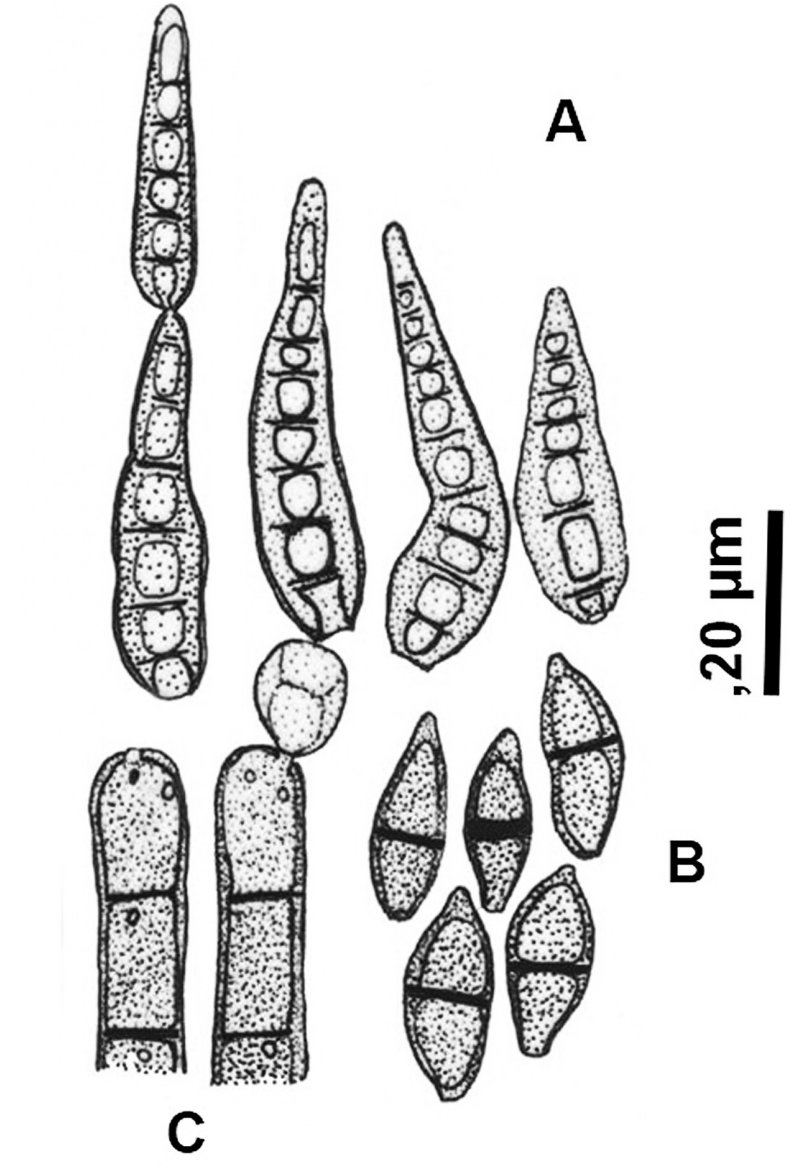

Fig. 3. *Helminthosporium dimorphosporum*
(Adapted from Holubová-Jechová 1987, fig. 2:3, *H. dimorphosporum* holotype, PRM 842 738).
A. Distoseptate conidia. B. Euseptate conidia. C. Conidiogenous cells.

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